Food insecurity

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Whether food production can keep pace with population growth and meet the needs of the currently undernourished is one of the most fundamentally important issues in the world, and one that is likely to lie beneath many international security concerns in the future. Since the mid-eighties, several agricultural trends that have been constantly positive throughout modern history have reversed and become worrisome. For example, world grain production, which had increased both absolutely and on a per capita basis through history has rolled over (See Figure 20-1) while the world population has continued to increase.

In 1950, the average grain production per person was 247 kilograms. It peaked in 1984, at 346 kilograms, after the impressive growth of the Green Revolution. But by 1995 per capita grain production had fallen back below 300 kilograms to just 293 kilograms per person. Even the absolute quantity of grain produced had stopped rising, with no more produced in the mid-nineties than had been produced in the mid-eighties—about 1,680 billion tons in 1986 and 1995 alike.

The following brief article mentions some of the important trends in the world

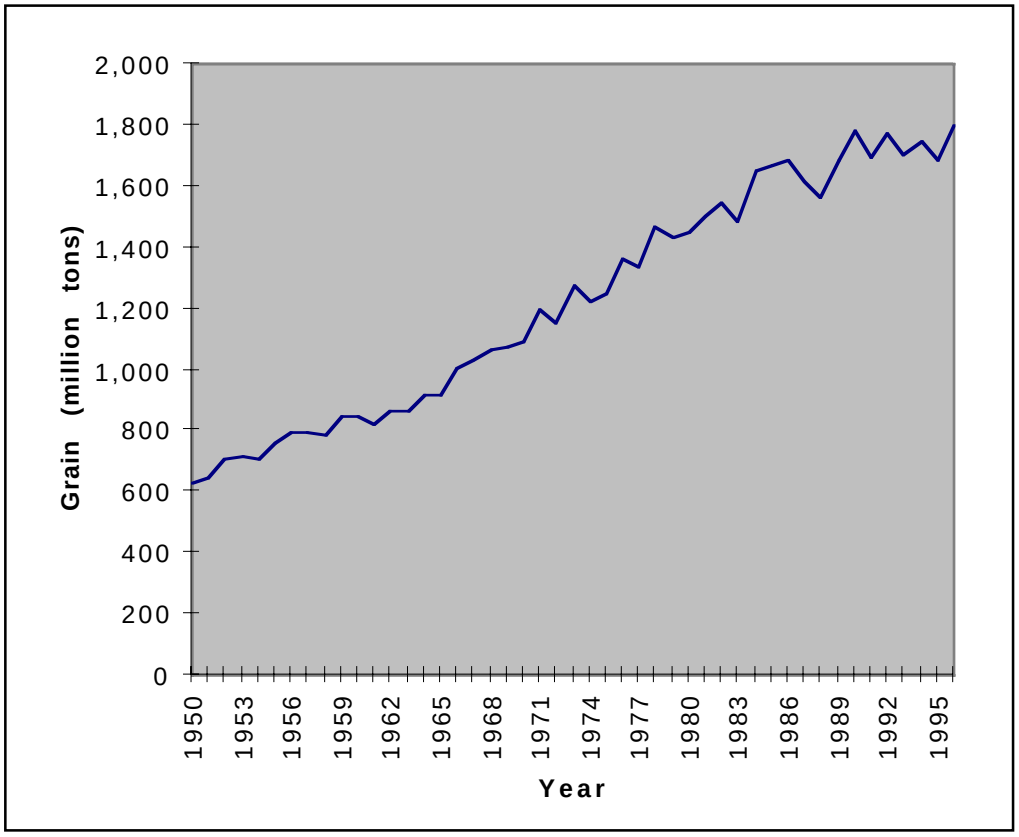

Figure 20-1. World grain production.

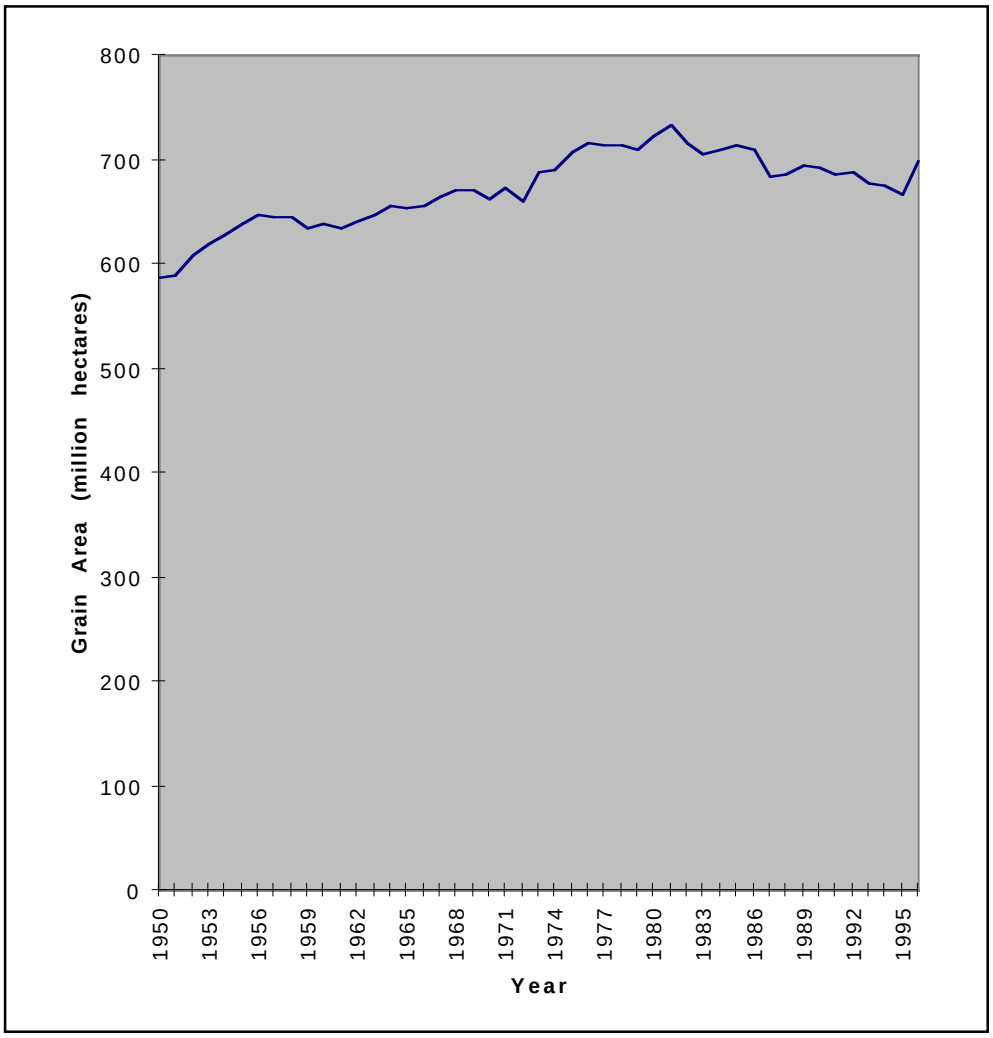

Figure 20-2. World area used for grain production.

food/population equation and indicates caution and the probability of international stress based on deficient food supply. A far more detailed discussion of these trends can be found in the book *Full House: Reassessing the Earth's Population Carrying Capacity* by Lester R. Brown and Hal Kane (1994).

The land area used to grow grain

For all of history, the amount of land used to grow grain has increased. From 587 million hectares in 1950, it rose quickly, for example, to a peak of 732 million hectares in 1981 (Figure 20-2.). Over the past 16 years, however, for the first time ever, the amount of land in grain production has decreased. By 1995, total grain harvested area was down to 665 million hectares. On a per capita basis, this was a drop from 0.23 hectares per person in 1950 to 0.12 hectares per person in 1995—a drop of one-half.

The U.N. Food and Agriculture Organization (FAO) says that an area of land about the size of Ireland is lost to production every year because of land degradation. An area about that same size is also put into production every year, currently leading to

a net constancy in grain harvested area. But, much of the land now used is of poorer quality, either because of agricultural mismanagement or because the better agricultural land is going to other uses, leaving lower quality land that is arid or now being cleared of forest for agricultural use.

This means that in the future ever growing amounts of food will have to be produced without the main historical engine of agriculture expansion—the bringing into production of more land. The burden carried for thousands of years by the cultivation of new areas will now have to be carried by increases in production efficiency or new food substances.

Changing trends in fertilizer use

The agricultural revolution, which started around 1960, depended on a large jump in the amount of fertilizer used by farmers. Fertilizer use grew steeply and was one of the most reliably increasing trends in the world. In 1950, the world used only 14 million tons of chemical fertilizer. The amount had climbed steadily to 146 million tons—more than a ten-fold increase in less than half a century (Figure 20-3.)—up until 1989, but that year saw the first ever major drop in fertilizer use. Fertilizer consumption

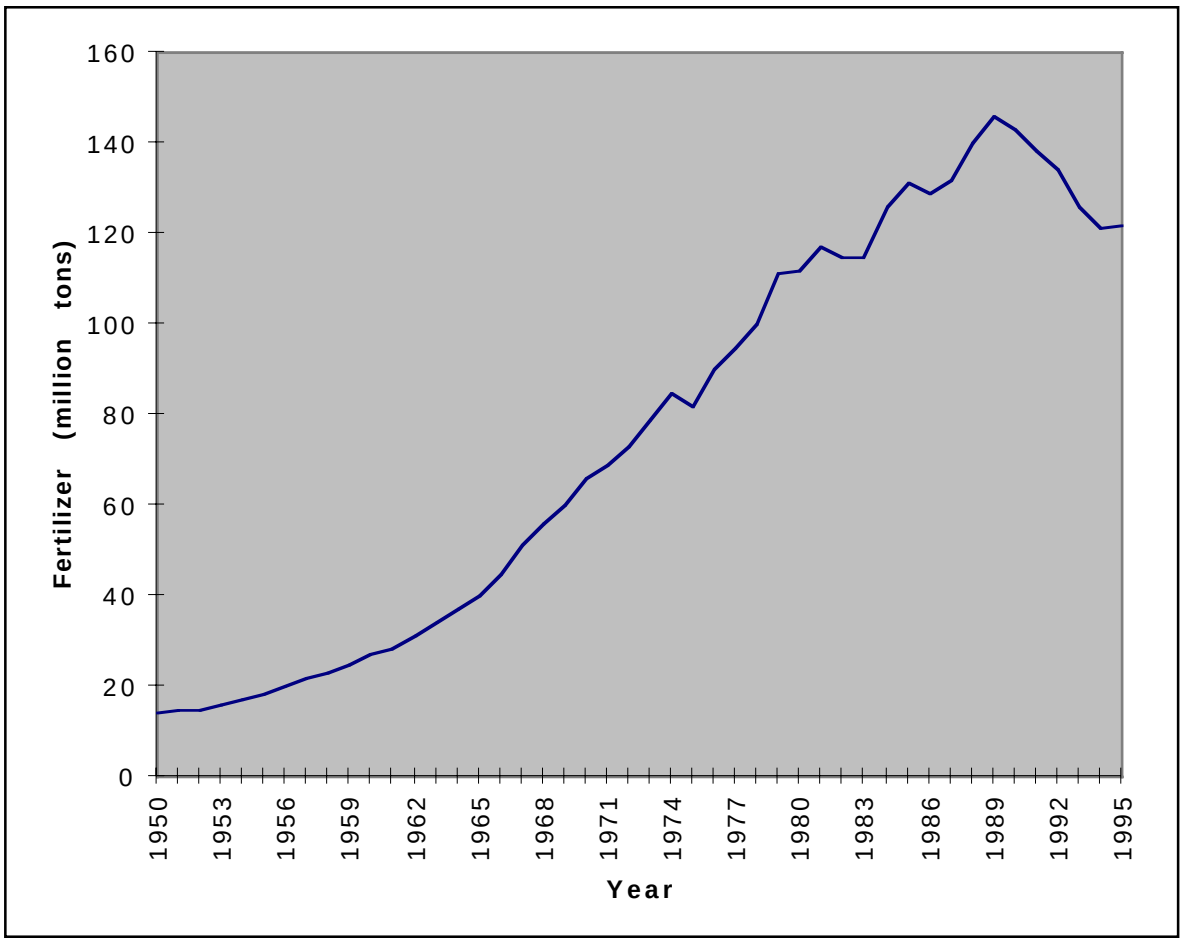

Figure 20-3. World fertilizer use.

fell steadily until 1994, dropping all the way back down to 121 million tons. Since then, fertilizer use has been about flat.

Most of this drop was due to changes in the former Soviet Union. That country had been subsidizing fertilizer use, and the disintegration of the old system did away with much of those subsidies, and fertilizer consumption there plummeted. Because the fertilizer was artificially inexpensive and because Soviet farmers did not know how to use it properly or did not have incentives to use it properly, much of the Soviet fertilizer use had been excessive—farmers had dumped more fertilizer on their fields than could be absorbed.

Even with the former Soviet Union factored out, the world still had a shrinking appetite for fertilizer beginning in the late eighties, and many people believe that the reason is that many fields were reaching a saturation point with fertilizer. Adding fertilizer to a field that has had little fertilizer has a large effect, but adding it to a field that already has had much applied accomplishes less. Once a field has absorbed as much fertilizer as it can, adding more has no effect, or even a negative effect.

Some parts of the world are not using enough fertilizer today, but the number of places that have reached the capacity of their lands to absorb fertilizer has grown substantially along with the historical rapid rise in fertilizer consumption. It now appears likely that fertilizer will be less of an engine in the future than it was in the past for expanding the world's food supply. It joins land as a lost or declining engine, and it leaves the burden of providing more food to other sources.

Irrigation

Another critical resource for expanding the food supply is, of course, irrigation. For every thousand people in the world in 1961, the world irrigated 45.3 hectares of land. And in order to expand the amount of food available, this irrigated area increased, especially during the seventies (Figure 20-4.). But in 1979, irrigated area joined grain harvested area and fertilizer use as another agricultural resource trend that had turned downward. The irrigated area per person fell through the eighties and early nineties, and is now back below the amount of irrigated land per person that the world had in 1961. The 1993 figure is 44.4 hectares of irrigated area for every one thousand people.

Like with quality grain land, people tend to settle near the places where irrigation is easiest—near rivers and lakes, for example. But once this land is used, people are forced to farm areas that are poorer in fertility and water. The costs of irrigation rise. Meanwhile, the number of people requiring food is rising constantly. In the future, increasing amounts of food will have to be grown despite the decline in per capita irrigated area.

The world's fish harvest

Another source of food that increased through all of history and then stopped growing during the eighties is the world's fish harvest. The world's fish harvest in 1950 was only 21 million tons. By 1989 it had grown to 100 million tons, almost a five-fold increase (Figure 20-5.). But that level marked the historical end to growth in the fish

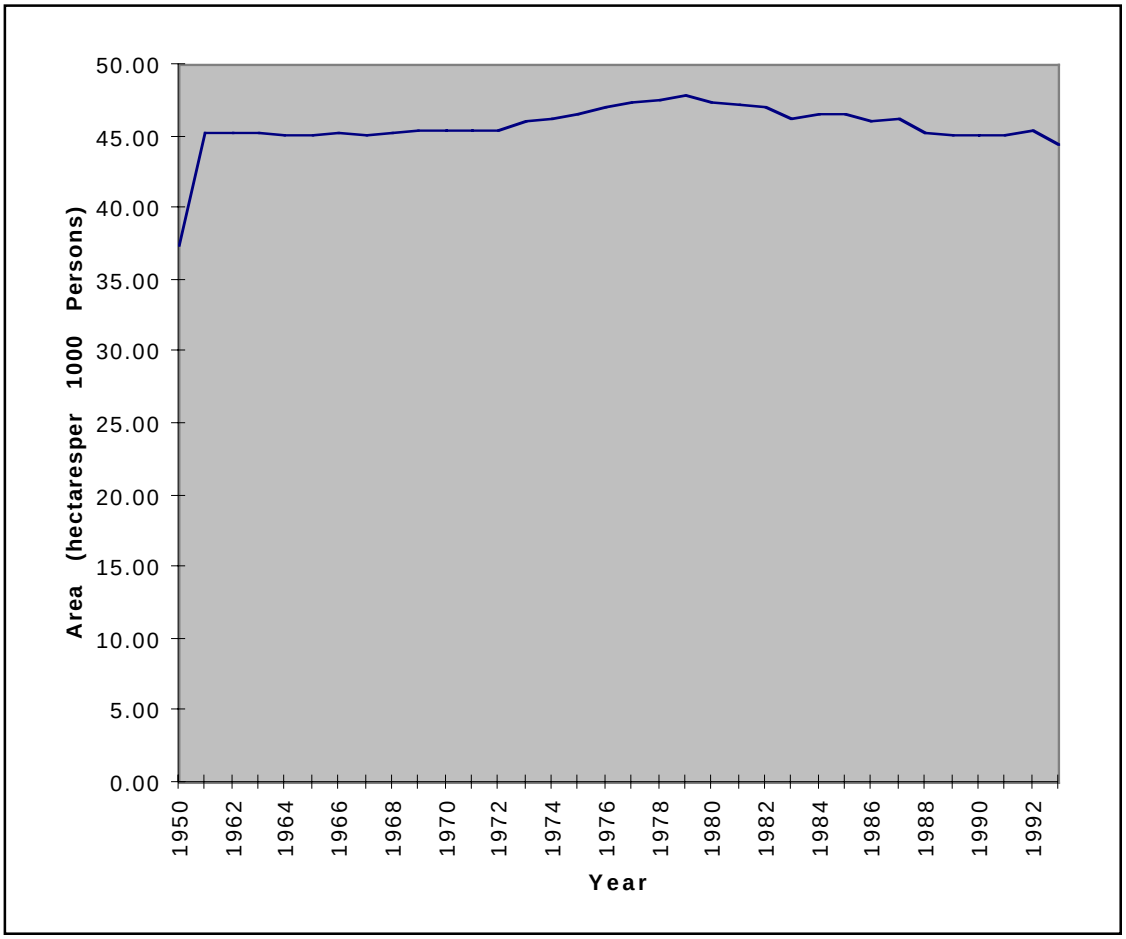

Figure 20-4. World irrigated area per 1000 persons.

harvest. World fish catch has remained approximately constant since then, and is now slightly over 100 million tons. Marine scientists, including those of the U.N. Food and Agriculture Organization (FAO), had long forecast an upper limit to the fish harvest, and many of them had estimated that approximately 100 million tons would mark that limit.

Aquaculture still has the ability to raise the world's fish harvest, but aquaculture requires the use of grain for feed that could instead be eaten directly by people, and it also requires land and water for the growing of fish. Nevertheless, aquaculture is the only remaining means to increase fish harvests FAO and most other organizations do not expect the natural harvests of the oceans and lakes and rivers to rise very much in the future.

The fish harvest is interesting on another level as well. With most foods, technology can be used to increase harvests. But with fishing, improved technologies such as better fishing boats actually cause part of the problem. Powerful fishing boats take fish faster than the fish can reproduce and so have caused the stocks to decline. Better fishing technologies only have the potential to reduce the fish harvests of the oceans, lakes, and rivers, not to increase them.

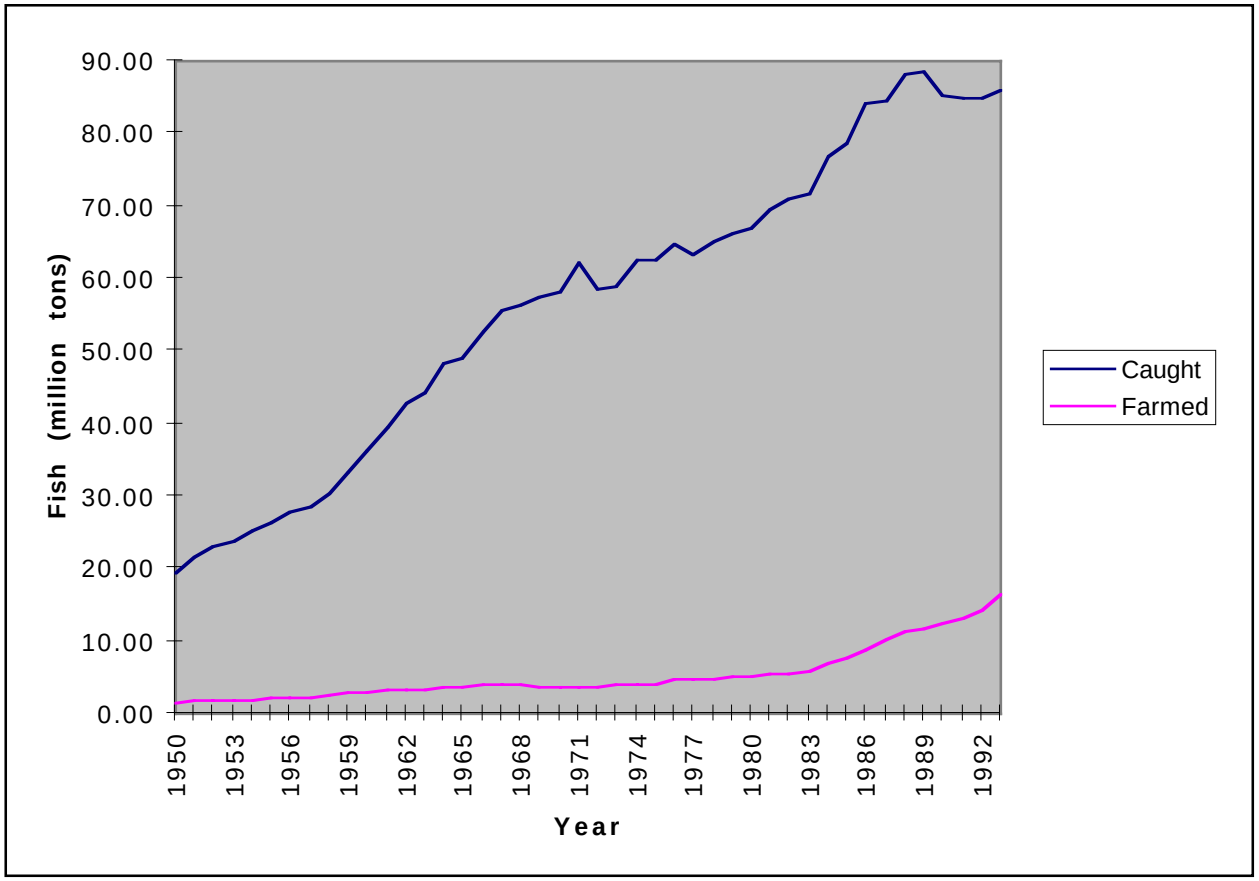

Figure 20-5. World fish caught and farmed.

Technological solutions

The end of growth in grain harvested area, fertilizer consumption, irrigated area per capita, fish catch, and in other trends like declines in the amount of grazing land available leave the burden of increasing food production squarely in the domain of improved technologies.

Technology may indeed solve these problems. There are several differences, though, between the technologies being created today and the task at hand. The inputs of the green revolution—more fertilizer, more water, and new seeds—were global solutions. Any farmer anywhere could fairly simply add more fertilizer and water and get more food. Little education was required, little capital was required, and the work did not have to be tailored to local conditions. New technologies are quite different from this. They are specific: suited to a particular pest or a particular soil or climate. Some of them are expensive, requiring more money than the farmers of Africa, South Asia, and Southeast Asia have. And many of them require training and research on local needs. These new technologies are ingenious; but they are not always suited to local farming conditions, or to the local economy or local culture.

Second, many new technologies are being targeted at expensive crops, because they are the most profitable. On the other hand, the budget of the institutions dedicated to making new seeds and technologies for common crops like grains and roots is not

rising, and in some years has shrunk. The Consultative Group for International Agricultural Research (CGIAR), the headquarters of which is housed at the World Bank, has never been adequately funded. Now, at a time when the need for food is growing and when poverty is widespread, the needed funding is not keeping pace.

The problem of hunger may be solvable. But one thing is clear: it will not be solved by accident or by laziness. Rising prices for food are not a miracle solution—there are no miracle solutions. What is called for is hard work, and hard research. Funds will have to be directed toward the CGIAR and other research and training organizations, if food security is to be addressed. Too many people brush aside the issues of food security, assuming that "technology" will solve the problems, even though they cannot say which technologies will do so, nor who will design those technologies.

The population side

Another way to fight hunger is to fight poverty and make families more able to buy and grow food. Lessened poverty tends to reduce birth rates, thereby reducing the total demand for food. Fighting poverty has this double benefit, and, of course, is also a priority goal for many other reasons.

In 1994, in Cairo, Egypt, the United Nations Population Conference came up with a set of goals to improve the state of the world's population, both its size and also the quality of people's lives. Food security was not intended as a major goal for these initiatives, but the reality is that they would also serve the purpose of improving food security. The initiatives include raising immunization rates, raising literacy rates, especially for young girls, making birth control available, improving human rights records, getting more access to health care, and in general, fighting poverty and raising the quality of life. There is no reason not to move forward with this work.

In fact, there is reason for some optimism. For example, immunization rates 10 years ago were only about 20% for children in developing countries. Today, the rate is about 80%. In a short number of years, and with a very manageable amount of money, the world's children became far more protected from many of the world's leading causes of death and disability. Birth rates are lower in countries that have low child-mortality rates, and so success with immunizations also becomes a success in dealing with population growth, and hence also a success for food security. In fact, it is reasonable to call this a national security success, since improved food security, reduced overpopulation, and more stable families all contribute to social stability and general security.

International security

Food shortages can destabilize governments and cause other political disruption in several ways.

First, they threaten some of the largest and most important governments in the world. China is projected to add almost half of a billion more people over the next 30 years, but is losing about 1% per year of its grainland to industrialization and urbanization because of its very rapid economic growth, and faces severe water scarcity in many regions. Already, these changes have added substantially to the "floating population" of

between 100 million and 160 million Chinese, many of them former farmers who no longer have the water or land to farm. This massive migratory population, larger than the entire population of Japan, could destabilize China if these people can not find food, employment, and housing. These pressures are strong in China, but they also exist in India, the world's second most populous country, and in north Korea, Russia, the Former Soviet states, and many African countries.

The world today has few wars between states. Instead there are many wars within countries that have fallen into civil disarray. Issues of hunger, scarcities of farmland and water, and other social and environmental problems drive these internal wars and greatly increase the destruction and misery that they cause.

Rwanda used to be Africa's most densely populated country and the second most densely populated country in the world. It suffered extreme scarcity of both farm land and irrigation water. The pressures contribute to the ethnic jealousies that led to fighting there. Similar situations exist in both Haiti and Somalia, extreme overpopulated and the lack of viable agricultural resources. These issues mix together, linking population, food, health, and political and military security, into a complex mess.

Second, food scarcity becomes an international security issue as well. Food scarcities reach across national borders and cause rising food prices everywhere. Since grain markets are global, China's buys bid up prices for others, for the United States and for poorer countries alike. In this way hunger enters countries other than the ones initially experiencing the food shortages. Food scarcity is a threat that can cross national borders.

Third, when people cannot feed their families at home, they begin to look elsewhere. Migrations like the internal migration in China can become international migrations and threaten the borders of neighboring countries Southern Europe, for example, is increasingly a destination for hungry people from Africa, to mention only one such situation.

Food security and the solutions to it are not normally brought into discussions of national security, but they should be. Dealing with these issues will reduce the tensions that contribute to instability. To conclude on a positive note, dealing with hunger is less expensive than dealing with conflict. And, dealing with hunger and poverty generates economic growth in both the short and long terms.

References

Brown, Lester R. and Hal Kane. 1994. *Full House: Reassessing the Earth's Population Carrying Capacity*. New York: W.W. Norton.